

CHAPTER 5

GENERAL PLAN UPDATE CAPACITY EVALUATION

5.1 INTRODUCTION

Background

The City of Chula Vista (City) is currently updating the City-wide General Plan. The initial phase of the update, which is referred to as *Vision 2020*, identified boundaries of the update study areas and culminated with the development of four alternative land use plans for these areas. As part of the Master Plan, an evaluation of the general impacts of each alternative on the existing City wastewater collection system was completed. The evaluation included analysis of projected hydraulic conditions in the City's existing collection system under buildout of each of the alternatives and a comparison of these analyses to the projected conditions under adopted General Plan buildout described in Chapter 4. This chapter presents findings of the evaluation.

Evaluation Objectives

The objectives of the General Plan Update sewer capacity evaluation include:

- Assess potential impacts to the existing trunk sewer system from implementation of each of the General Plan Update land use alternatives
- Quantify facility improvements that may be required to implement each alternative
- Compare the relative impacts of each alternative

Scope of Work

The scope of the evaluation consists of hydraulic analysis of the City's existing sewer mains, generally 12-inch in diameter or larger, however certain 8-inch diameter pipes were analyzed as part of this evaluation. Development of future wastewater flow projections for each alternative land use is based on City-provided data limited to land use information extracted from Traffic Analysis Zone (TAZ) information. Based on the available General Plan Update data, analysis of small diameter collector sewers (generally less than 12-inches in diameter) and additional detailed land use assessment were not included in the evaluation. Analysis of local sewer collector systems will be required to support specific development proposals.

5.2 METHODOLOGY

Hydraulic Model

Capacity in the existing trunk sewer system was evaluated using the hydraulic model described in Chapter 4. The model includes all City sewer mains 12-inches and larger, some critical smaller diameter sewers, and permanent and temporary sewer pump stations.

Loading to the model was based on land use information provided by the City in ArcGIS format and unit generation rates estimated through calibration of the model using recent metered flow data recorded during both dry and wet conditions. Future loading projections were estimated by assuming development of all vacant parcels per current zoning classifications.

To evaluate the general plan land use alternatives, the incremental additional wastewater generated in the study areas due to implementation of each alternative was determined by subtracting the projected buildout flows for each alternative from the projected flow based on the current GDP buildout. These flows were determined by applying the calibrated unit generation rates to projected residential unit counts and non-residential areas given in current TAZ data provided by the City. The incremental flow increase was then assigned to the corresponding tributary manholes in the hydraulic models and simulated downstream flow depths were evaluated based on a maximum flow depth to pipe diameter ratio (d/D) criteria of 0.85. Note that while City design criteria specifies that pipes 12-inches in diameter or greater should be designed with peak flow depths not exceeding 75% full, recommendations for pipe replacement with a larger diameter pipe is made when there is an indication that a section of pipe is or will be flowing at more than 85% full.

Planning Criteria

The hydraulic analysis was based on the wastewater generation rates shown in Table 5-1. These rates were determined through calibration of the hydraulic model. Rain dependant inflow and infiltration (RDII) was simulated by increasing the average dry weather loading by a factor of 10 percent, consistent with observed RDII at metering stations within the General Plan study area.

Table 5-1
Wastewater Generation Rates

Land Use Classification	Unit Wastewater Generation Rate
Single-Family Residential	195 – 225 gpd/DU
Multi-Family Residential	146 – 169 gpd/DU
Commercial	800 – 1500 gpd/acre
Industrial	1,400 – 1,500 gpd/acre

5.3 GENERAL PLAN ALTERNATIVES

The City has developed four alternative land use plans for the General Plan Update. The alternatives include land use changes, which consist of either land use classification changes or density modifications or both, for the general planning areas. These areas have been designated in the General Plan Update as the Northwest, Southwest, and East.

The Northwest area includes land use changes along Broadway and Third Avenues north of “L” Street, and several blocks generally bounded by “T” Street, “D” Street, I-5, and Third Avenue. The Southwest area includes land use modifications along Broadway, Third Avenue, Main Street south of “L” Street, the Bayfront area and several blocks generally located just west and east of I-5 between Main Street and Orange Avenue. The East area incorporates portions of the Eastern Urban Center, Otay Ranch Villages 2, 3, 4, 7, 8, 9, and 10, and Planning Area 12.

General Planning concepts of Alternatives 1 through 3 are shown in Figures 5-1 through 5-3. Comparisons of the detailed land use changes proposed under each alternative are provided in Appendix F as well as model loading and model results for the impacted basins.

5.4 FINDINGS

Trunk Sewer Impacts

Simulated peak wet weather flows were modeled in existing mains generally 12-inch diameter and larger, however certain 8-inch diameter pipes were analyzed as part of this evaluation. Figures 5-4 through 5-7 illustrate the reaches that were identified as having capacity constraints (defined as peak d/D ratios greater than 0.85) under buildout of the current GDP and the additional constrained reaches identified under buildout of each alternative land use plan. The additional constrained reaches are summarized below. Table 5-2 presents the simulated d/D for each reach.

Main Street Trunk Sewer System

Note that the City has proposed constructing a diversion structure in the Main Street Trunk Sewer to relieve capacity constraints in the sewer. Construction of this structure may mitigate some of the impacts listed below for the Main Street Trunk Sewer. Additional hydraulic analysis would be required to quantify the extent of mitigation.

- Reach 6331 to 6328 showed an increased flow depth in all four Alternatives. Alternatives 1 and 2 marginally exceeded the d/D threshold in two of the four sections within the reach, while Alternative 3 exceeded the threshold in these two reaches by a greater amount. The Preferred Alternative exceeded the threshold in all three segments of the reach. The constraint arises in this reach due to relatively shallow sewer slope.

General Plan Capacity Evaluation

- Reach 5129 to 5127 showed significant flow depth increases under all four alternative buildout conditions. This reach is located in Main Street just upstream of a constrained reach identified under current GDP buildout conditions.
- Reach 5053 to 5092 showed significant increases in flow depths under all four alternative buildout conditions. The reach is located on Fresno Avenue, north of and tributary to a constrained reach in Main Street identified under current GDP buildout conditions.
- Reach 5045 to 5079 showed significant flow depth increases under all four alternative buildout conditions. This reach is located in Industrial Avenue north of and tributary to a constrained reach in Main Street identified under current GDP buildout conditions. Alternative 3 impacts only a portion of this reach.

Industrial Avenue Trunk Sewer System

- Reach 4525 to 4328 was impacted under all four alternatives. Additional loading from Alternatives 2, 3 and the Preferred Alternative resulted in flow depths exceeding the d/D threshold in a majority of the reach sections. Minor impacts resulted from Alternative 1 loading. This reach is located just upstream of a constrained reach in Colorado Avenue identified under current GDP buildout conditions. Alternative 2 would result in the greatest impact due to proposed increased commercial density along Broadway.

G Street Trunk Sewer System

- Reach 5316 to 5299 showed peak flow depths that exceeded the d/D threshold under Alternative 3 and the Preferred Alternative loading, and no impacts under Alternatives 1 and 2. This reach is located between Third and Fourth Avenue north of Memorial Park just upstream of a constrained reach identified under current GDP buildout conditions
- Reach 3001 to 3094 showed minor impacts under Alternatives 1 and 3 and no impacts under Alternative 2 and the Preferred Alternative buildout loading conditions. This reach is located in Colorado Street just north of "G" Street.

Collection System Impacts

Analysis of smaller sewer collectors was not possible based on the planning-level land use data available for this evaluation. Such analysis should be performed after more detailed building or redevelopment plans have been developed. Depending on the magnitude of proposed land use changes, 8-inch diameter sewers serving new development in the Northwest and Southwest areas may be impacted by the additional loading.

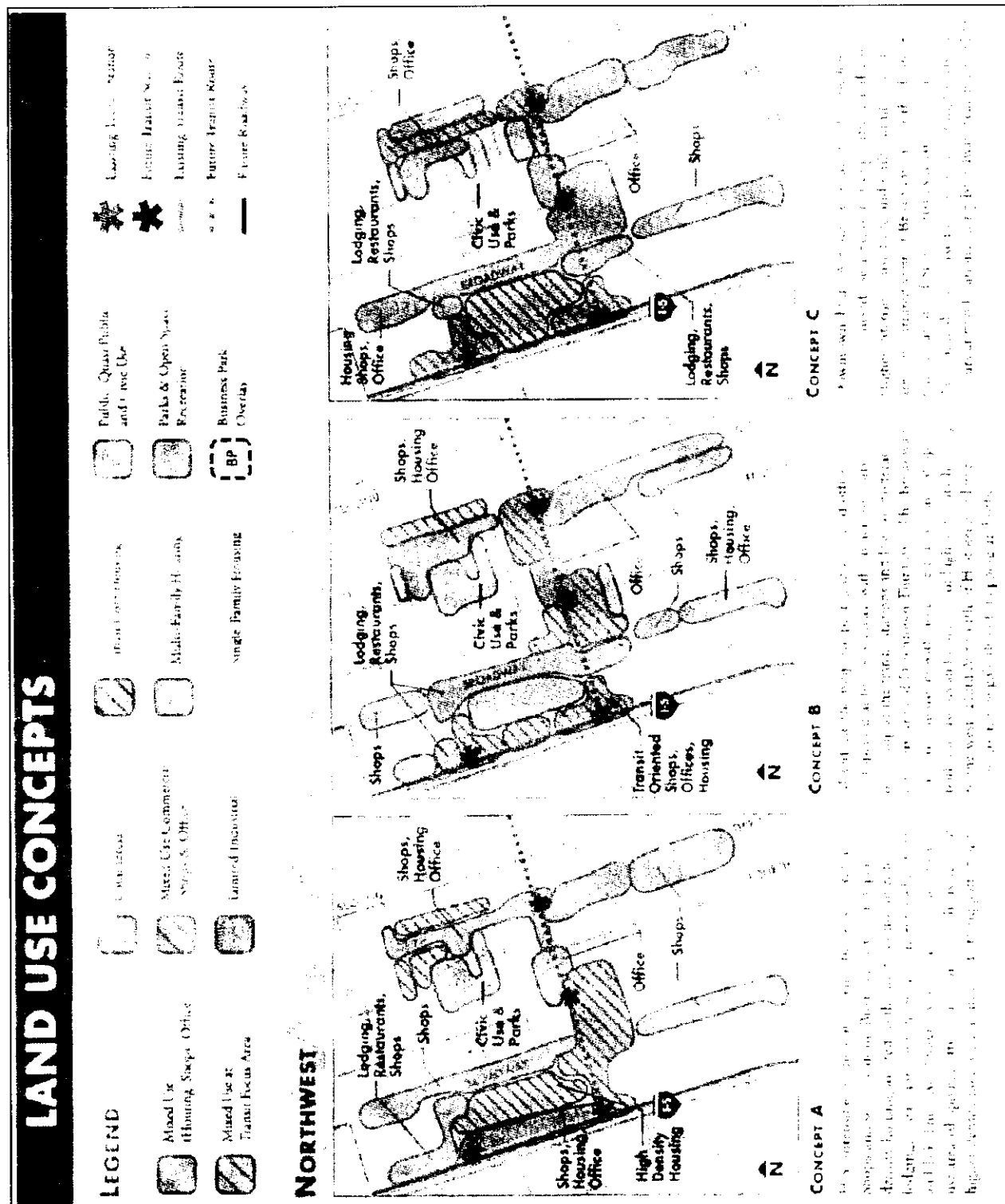


Figure 5-1 Northwest Land Use Concepts









Table 5-2
Simulated Peak Flow Depth to Diameter Ratios

Reach		Pipe Diameter (in)	Reach Length (ft)	Maximum d/D ⁽¹⁾					
Upstream Node	Downstream Node			Existing Condition	Current GP Buildout	Alt 1 Buildout	Alt 2 Buildout	Alt 3 Buildout	Preferred Alt
Main Street Sewer									
6327	6328	8	235	0.75	0.78	0.87	0.87	1.06	1.34
6326	6327	8	305	0.75	0.78	0.87	0.87	1.06	1.34
6331	6326	8	235	0.61	0.63	0.69	0.69	0.73	1.08
5129	5127	10	330	0.64	0.69	3.47	2.5	2.59	3.13
5053	5088	12	375	0.56	0.58	2.5	1.55	1.57	1.55
5088	5092	12	10	0.56	0.58	2.55	1.6	1.62	1.60
5045	5058	12	210	0.53	0.56	1.14	1.8	0.70	0.89
5058	5079	12	245	0.66	0.70	3.64	3.98	2.81	3.46
Industrial Avenue Sewer									
4525	4492	15	430	0.70	0.73	NC	0.83	0.84	1.00
4492	4455	15	445	0.70	0.73	NC	0.99	NC	1.16
4455	4409	15	445	0.72	0.75	NC	1.18	NC	1.28
4409	4369	15	450	0.72	0.75	NC	1.33	1.01	1.37
4369	4337	15	435	0.71	0.75	0.91	1.66	1.38	1.67
4337	4328	15	265	0.80	0.84	1.06	1.7	1.42	1.7
"G" Street Sewer									
5316	5301	12	195	0.39	0.36	NC	NC	1.17	0.83
5301	5299	12	130	0.51	0.39	NC	NC	1.45	1.13
3001	3094	12	380	0.65	0.62	0.94	NC	0.93	NC
Total Length of Pipe Exceeding d/D = 0.85						2,790	3,750	3,355	4,545

⁽¹⁾ NC indicates no change from the Current GP Buildout condition

Metro Capacity Impacts

As discussed in Chapter 3, the City owns capacity in the City of San Diego's METRO conveyance and treatment system. Projected future flows generated by buildout of the current General Plan will exceed the City's current capacity. Based on analysis of the TAZ land use projections for each General Plan Alternative and the unit generation rates given in Table 5-1, the City's METRO capacity requirement would be increased by approximately 1.9 mgd, 2.2 mgd, and 2.0 mgd for Alternative 1, Alternative 2, and Alternative 3, respectively, and 2.9 mgd for the Preferred Alternative. Table 5-3 presents a summary of estimated General Plan impacts to METRO capacity requirements. These additional amounts will need to be purchased as part of future capacity acquisitions.

**Table 5-3
Estimated Impacts**

Condition	Average Daily Flow (mgd)	Additional METRO Capacity Requirement (mgd)	Incremental METRO Capacity Requirement Over Adopted General Plan Requirement (mgd)
Existing Flow	16.3	N/A	N/A
Current METRO Capacity	19.9	N/A	N/A
Adopted General Plan Buildout	23.3	3.5	N/A
Alternative 1 Buildout	25.2	5.3	1.9
Alternative 2 Buildout	25.5	5.6	2.2
Alternative 3 Buildout	25.3	5.4	2.0
Preferred Alternative Buildout	26.2	6.3	2.9

5.5 CONCLUSIONS

The overall City-wide impacts from each of the alternative land use plans are minor from the standpoint that additional lineal footage of constrained sewer ranges from approximately 2,800 to 4,500 feet. If the City constructs a proposed diversion structure in the Main Street Trunk Sewer, the additional constrained reaches may be reduced by as much as approximately 2,000 feet. Additionally, the majority of the additional constrained reaches are extensions of proposed future improvements and could be constructed as part of these projects. Note that the identified improvements represent the minimum improvements required to support the land use alternatives; the City may elect to improve additional reaches based on further studies. Implementation of any of the alternatives will likely require acquisition of additional METRO capacity, which may result in considerable additional incremental costs to the City.

Proposed land use changes in the eastern area would be served by 36-inch diameter and larger reaches of the Salt Creek Interceptor. These reaches have adequate capacity to convey the estimated additional flows from each of the land use alternatives.

Based on total length of additional constrained reaches, Alternative 1 would impact the least extent of sewer mains and the Preferred Alternative would impact the greatest extent of sewer mains. Additionally, the Preferred Alternative would generate the greatest incremental increase in wastewater flows and, consequently, may necessitate the largest acquisition of additional METRO capacity.